Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2298714 A1 2001/08/16

(21) 2 298 714

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2000/02/16

(41) Mise à la disp. pub./Open to Public Insp.: 2001/08/16

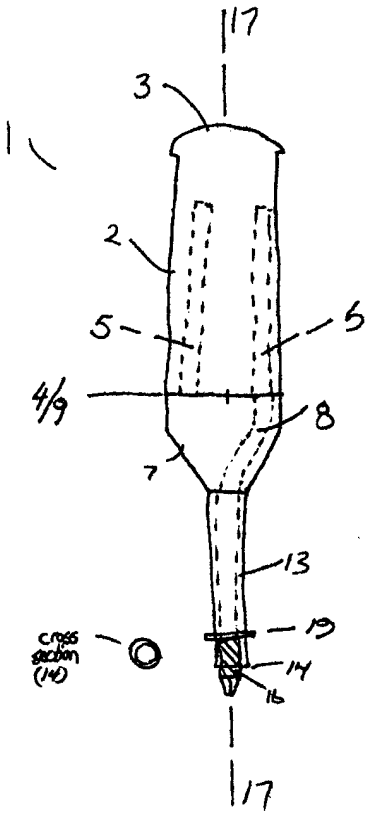
(51) Cl.Int.^{7}/Int.Cl.^{7} B25B 19/00

(71) Demandeur/Applicant:
REIMCHE, RON, CA

(72) Inventeur/Inventor:
REIMCHE, RON, CA

(74) Agent: FURMAN & KALLIO

(54) Titre : TOURNEVIS MONOBLOC MULTILAMES
(54) Title: SELF-CONTAINED MULTI-BIT SCREWDRIVER



(57) Abrégé/Abstract:
A screwdriver with multiple bits is disclosed. The bits do not need to be removed in order to be selected and used. The bits are stored within storage apertures in the handle of the screwdriver, and one bit at a time can be selected and moved through a channel from its bit storage aperture down to the drive end of the screwdriver where it can be locked in position for use. The unitary construction of the unit should lead to less loss of screwdriver tips or bits.

ABSTRACT

A screwdriver with multiple bits is disclosed. The bits do not need to be removed in order to be selected and used. The bits are stored within storage apertures in the handle of the screwdriver, and one bit at a time can be selected and moved through a channel from its bit storage aperture down to the drive end of the screwdriver where it can be locked in position for use. The unitary construction of the unit should lead to less loss of screwdriver tips or bits.

SELF-CONTAINED MULTI-TIP SCREWDRIVER

This invention is in the field of hand tools, and more particularly deals with a set of contained rotary hand tools, including a plurality of interchangeable screwdriver tips or the like.

BACKGROUND

For craftsmen and tradespeople, multiple bit screwdrivers have become widely used as they allow a user to drive a variety of screws or perform a number of other rotary hand tool actions, with a single tool. These multiple bit screwdrivers typically include interchangeable bits of varying sizes and styles, such as a blade or flat head bit, a Phillips bit, square head or Roberts type and others. By simply interchanging the bit on the end of the screwdriver, a user can drive different types of screws with a single tool.

One of the problems which has developed with these multiple bit screwdrivers is that the bits can easily be lost. Several types of these screwdrivers have been designed with handles

that are equipped for storing the multiple bits, but these have not all been cheap to manufacture or easy to use and, generally speaking, bits are still occasionally lost since they need to be removed from the screwdriver to be placed into the storage apertures in the handle.

One more recent example of such a multiple bit screwdriver with removable bits that can be lost is disclosed in United States Patent No. 5,881,615 to Dahl et al.

SUMMARY OF THE INVENTION

It is the object of the present invention to provide a self-contained multi-bit screwdriver which will allow for the storage and loading of various bits into the end of a multiple bit screwdriver, without the physical removal of the bit from the screwdriver body for loading into the shaft.

The invention, a self-contained multi-bit screwdriver, accomplishes its objects comprising substantially a handle body having a cap end and a drive end, said handle body having a plurality of bit storage apertures therein extending longitudinally within said handle body from the drive end,

wherein said bit storage apertures are arranged in a circular pattern about the central axis of said handle body at a radial distance therefrom; a base having an attachment end and a shaft end, the attachment end thereof being rotatably attached to the drive end of said handle body such that said handle body can be rotated in relation to said base; a selection aperture passing through said base from the attachment end to the shaft end wherein at the attachment end the selection aperture can be selectively aligned with said bit storage apertures upon rotation of said handle body in relation to said base; a hollow shaft extending from the shaft end of the base, said shaft including a bit end; and locking means at said bit end whereby a bit can be selectively engaged in a torque transmitting engagement. When a bit storage aperture is selected by alignment with the selection aperture, a channel is formed which will allow the bit stored in the selected bit storage aperture to slide down through the base and the shaft to the bit end.

At the heart of the present invention is the ability of the screwdriver of the present invention to accommodate a plurality of different bits within the storage apertures without requiring removal of one or more of the bits from the storage apertures to employ a bit at the bit end of the

screwdriver.

The cap end of the handle body might either be fixed or integral, or alternatively could be made removable so that the bits contained within the bit storage apertures could be removed.

The shaft and the base might be two separate elements, or alternatively might be one integral unit. Another method of production of the same would be to have the shaft extend upwards through the base to the attachment edge thereof, whereby the selection aperture extending through the base would actually be a part of the hollow shaft itself.

A further addition to the screwdriver of the present invention would be to add an indicator to show when the selection aperture is properly aligned with a particular bit storage aperture.

Various types of locking means could be used at the bit end of the screwdriver. Any type of a lock which engages a bit which has slid down from its bit storage aperture to the bit end of the shaft and holds such a bit in a torque transmitting fashion, is contemplated within the scope of the present

invention.

The screwdriver of the present invention might be further modified by adding an offset crank section to the shaft, provided that the interior profile of the hollow shaft was still such that a bit could travel through the shaft from the bit storage aperture to the bit end.

The bit end of the shaft might be further modified to prohibit the removal of a bit from the shaft via the bit end. For example, an inward facing flange might be provided at the bottom edge of the bit end of the shaft, which flange would prohibit the falling of a bit out of the shaft but still allow the tool end of the bit to be exposed at the bit end of the shaft.

The shaft might either be straight or, in certain circumstances, might be bent provided that the necessary modifications are made to the interior profile of the shaft, and it will be understood that such modifications are contemplated within the scope of the present invention. In the case of the shaft being straight, it is particularly contemplated that the handle body, the base and the hollow shaft might share the same longitudinal axis through the

centre of the drive end of the handle body.

DESCRIPTION OF THE DRAWINGS:

While the invention is claimed in the concluding portions hereof, preferred embodiments are provided in the accompanying detailed description which may be best understood in conjunction with the accompanying diagrams where like parts in each of the several diagrams are labeled with like numbers, and where:

Figure 1 is a perspective view of one embodiment of the apparatus of the present invention;

Figure 2 is a top view of the drive end of the handle body of the embodiment of Figure 1, demonstrating the positioning of the bit storage apertures in relation to the central axis thereof;

Figure 3 is a top view of the base of the embodiment of Figure 1, demonstrating the positioning of the selection aperture in relation to the central axis thereof;

Figure 4 is a perspective view of another embodiment of the apparatus of the present invention, demonstrating a unitary shaft and base;

Figure 5 is a perspective view of another embodiment of the apparatus of the present invention, wherein the shaft extends through the base, forming the selection aperture;

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS:

As outlined above, the present invention is a multiple bit screwdriver which allows for the internal storage and movement of the various bits between their storage and used positions, without the need to remove any of the bits from the handle of the screwdriver in order to position the bit for use.

Figure 1 is a perspective view of one embodiment of the screwdriver of the present invention. There is shown the screwdriver (1), of which the main portions are the handle body (2), the base (7) and a hollow shaft (13).

Generally speaking, the handle body (2) of the screwdriver (1) would be sized to be grasped by the user's hand.

The handle body (2) has a cap end (3) and a drive end (4). The cap end (3) of the handle body is the end of the screwdriver which will face the user of the screwdriver and is furthest from the actual drive implement or bit attached thereto. The distal end of the hollow shaft (13) is the bit end (14), which will engage a bit and actually provide the working end of the tool (1). The drive end (4) of the handle body, which is shown in this particular situation to be approximately planar, is the end of the handle body which will interface with the remainder of the mechanism. Disposed within the handle body (2) are a plurality of bit storage apertures (5). The bit storage apertures (5) are shown in this case extending from the drive end (4) of the handle body towards the cap end (3) thereof, but not reaching the cap end (3). This particular embodiment demonstrates a closed system, wherein the placement of the bits in the apparatus at the time of manufacture will be the only time that bits will be entered into or removed from the bit storage apertures (5).

Figure 2 is a top view of the drive end (4) of the handle body. In this particular embodiment, six bit storage apertures (5) are shown. It will be understood that the number of bit storage apertures (5) could be varied dependant upon the requirements of the instant situation, and that any

number of bit storage apertures (5) is contemplated within the scope of the present invention insofar as varying the number of bit storage apertures (5) would be obvious to one skilled in the art. Also shown in Figure 2 is the centre point (6) of the handle body, which also demonstrates the central axis (17) thereof. As can be seen from these figures, the bit storage apertures (5) are displaced in a circular pattern about the central axis (17) of the handle body, each bit storage aperture (5) being positioned a radial distance from the centre point (6) of the handle body.

Also shown in Figure 2 are a series of indicator markings (18). Indicator markings (18) will be used in conjunction with a selection mark (19) on the base (7) to indicate to the user of the tool (1) when the selection aperture (8) is properly aligned with the desired bit storage aperture (5).

Bits (16) can be placed within the bit storage apertures (5) of the handle body (2) in advance of the attachment of the handle body (2) to the remainder of the screwdriver (1).

The base (7) has an attachment end (9) and a shaft end (10). There is a selection aperture (8) passing through the base (7). The selection aperture (8) at the attachment end (9) of

the base is positioned the same radial distance from the centre (11) of the base as the bit storage apertures (5) are radially displaced from the centre point (6) of the handle body. This position combined with the rotatable attachment of the base (7) and handle body (2) will allow for the selective alignment of a single bit storage aperture (5) at a time with the selection aperture (8). The selection aperture (8) then extends through the base (7) and exits the shaft end (10) of the base aligned along the central axis (17). Attached to the shaft end (10) of the base is the hollow shaft (13). The extreme end of the shaft (13) is the bit end (14).

Figure 3 is a top view of the base (7), showing the passage of the selection aperture (8) therethrough. Also shown in Figure 3 is a selection indicator marking (19) on the outer surface of the base (7), which is aligned with the selection aperture (8) such that the selection markings (18) can be used to assist in the proper alignment of the selection aperture (8) with a desired bit storage aperture (5) by aligning the selection marking (19) with the desired bit marking (18) on the handle body (2), upon rotation of the handle body (2) and base (7) in relation to each other. It will be understood that various other type of indicators could also be used to accomplish the same objective of providing a method of showing

the operator of the tool when the selection aperture (8) is properly aligned with a desired bit storage aperture (5). For example, the handle body (2) might be made out of clear material such that the alignment of the selection aperture (8) and the selected bit aperture (5) could be visually co-ordinated in that fashion. It will be understood that there are other types of indicators which could be used also, and that all such methods of indication are contemplated within the scope of the present invention.

In this case, the shaft (13) is straight. As a result of the proper attachment and alignment of the handle body (2) and the base (7), along with the straight shaft (13), the body (2), the base (7) and the shaft (13) all share a common longitudinal axis. It will be understood that in certain situations, as demonstrated in subsequent Figures, the shaft (13) may not be straight, and while the base (7) and body (2) will likely always share the same longitudinal axis, that may not necessarily be the case with the shaft (13), which might have bends or deflections placed therein depending on special purposes for the use of the tool (1). It will be understood that both such embodiments, namely where the shaft, handle body and base share a common longitudinal axis, as well as where they do not, are contemplated within the scope of the

present invention.

At the heart of the invention is the co-operative nature of the bit storage apertures (5), the selection aperture (8) and the shaft (13). When it is desired to use a particular bit stored in a bit storage aperture (5), the bit storage aperture (5) is selected by aligning same with the selection aperture (8), which then allows for the formation of a channel from the bit storage aperture (5) through to the bit end (14) of the shaft through the base. The bit (16) stored in the selected bit storage aperture (5) would then be able to be slide, moved or could fall from its position in the bit storage aperture (5) down through the selection aperture (8) through the base (7), and through the shaft (13) to the bit end (14). It can then in turn be engaged by the locking means (15) at the bit end (14) of the shaft. When it is desired to switch to a different bit (16), the locking mechanism (15) can be released and the active bit will slide back up into its respective bit storage aperture (5) upon tipping up of the screwdriver (1). The selection aperture (8) can then be aligned with the next necessary bit storage aperture (5) and the new bit (16) locked in position at the bit end (14) of the shaft.

Various types of locking mechanisms (15) could be used to

engage a bit (16) in position at the bit end (14) of the shaft. Some conventional methods include a resilient clip, an o-ring, a moveable chuck, or a magnetic attraction of some type. It will be understood that any such locking mechanism which accomplishes the goal of locking a bit (16) in position at the bit end (14) of the shaft (13) such that it can be used to drive a screw of the like, such lock providing a torque transmitting effect as well as the positional hold in relation to the shaft (13), will be contemplated within the scope of the present invention.

The upper portion of each bit (16) includes means by which to form a torque transmitting engagement with the bit end (14) of the shaft (13). For example, as shown in Figure 1, the upper portions of the bit (16) have hexagonal-shaped cross-sections configured to meet with a corresponding hexagonal opening at the bit end (14) of the shaft (13). A locking pin (19) can then be placed through an aperture extending across the shaft (13) to lock the bit (16) down in position. In alternative embodiments, numerous other known configurations could be utilized for transferring torque between the bit (16) and the bit end (14) of the shaft (13). For example, bits having a variety of polygonal shapes can be utilized.

The working tool end of a bit (16) will extend beyond the bit end (14) of the shaft when the bit (16) is locked in position by the locking mechanism (15). The upper portion of the bit (16) will remain inside of the shaft (13) while the bit (16) is locked into working position.

The bits (16) have ends which are configured to form screwdriver blades. Exemplary types of screwdriver blades suitable for use with the present invention are Phillips-type, blade-type, square head or Robertson-type, flat head or torx-type blades. Of course, the bits (16) could also be equipped with a variety of other structures suitable for transferring torque and it will be understood that any such alteration is contemplated within the scope of the present invention. It will also be understood that different types of tools such as a drill bit, scribe or punch could to some extent be modified to fit onto such a bit (16) and that might further extend the utility of the present invention.

Figure 4 demonstrates another embodiment of the screwdriver (1) of the present invention. Again there is shown the handle body (2), the base (7) and the shaft (13). What is different about this embodiment is that the shaft (13) and the base (7) are actually formed as a unitary body and there is not a shaft

attachment point. In certain cases, the unitary construction of the base (7) and the shaft (13) might allow for additional strength of the unit. It will be understood that the base (7) could be of various shapes and sizes so long as base (7) accomplishes the goal of joining together the shaft (13) and the handle body (2).

In the embodiment shown in Figure 4, the cap end (3) of the handle body (2) is removable. As well, the bit storage apertures (5) extend all the way through the handle body (2), from the drive end (4) to the cap end (3). The combination of the removable cap end (3) and the bit storage apertures (5) extending all the way through the handle body (2), would allow for the changing of the set of bits (16) stored within the handle body (2).

Figure 5 shows yet another embodiment of the screwdriver (1) of the present invention, wherein the shaft (13) and the base (7) are two separate elements, but the shaft (13) extends through the base (7), to the attachment edge thereof, and the shaft (13) in this fashion actually defines the selection aperture (8).

Also shown in the embodiment of Figure 5 is the addition of an

offset crank section (20) to the shaft (13). It will be understood, both in terms of the transitional bend in the shaft (13) as shown in all of Figures 1, 4 and 5, as well as any bend required to place an offset crank section (20) to the shaft (13), that the only limitation upon the sharpness or profile of these bends or angles would be that they be designed with the proper interior profile and space to allow for the movement of a bit (16) from a bit storage aperture (5) down to the bit end (14). Where the bit (16) was shorter, the angles or bends could be sharper. Where the bit (16) was longer, the angles or bends would need to be more gradual. It will be understood that any combination of bit sizes and bends or angles in the shaft (13) or the selection aperture (8) is contemplated within the scope of the present invention insofar as this would be obvious to one skilled in the art in light of the disclosure of this patent.

A different type of locking mechanism (15) is shown in the embodiments of Figures 4 and 5, to demonstrate various types of locking mechanisms which could be used without departing from the scope of the claimed invention.

Shafts, handle bodies and bases of varying sizes could be used to produce a screwdriver (1) of various sizes. For example,

in certain circumstances it might be preferable to shorten or lengthen the shaft (13) dependent upon the operating circumstances of the apparatus. It will be understood that any such changes in dimensions or profiles are contemplated within the scope of the present invention.

Also, while varying numbers of bit storage apertures (5) are shown in the Figures herein, for demonstrative purposes only, it will be understood that the number of bit storage apertures (5) and/or bits (16) to be used within the screwdriver (1) of the present invention could be varied without departing from the scope of the present invention.

With regard to the foregoing description, it is to be understood that changes may be made in detail, especially in matters of the construction materials employed and the shape, size and arrangement of the parts without departing from the scope of the present invention. It is intended that the specification and depicted embodiments be considered exemplary only, with the true scope and spirit of the invention being indicated by the broad meaning of the following claims.

CLAIMS:

I claim:

1. A screwdriver for use with a plurality of bits, said screwdriver comprising:

a) a handle body having a cap end and a drive end, said handle body having a plurality of bit storage apertures therein extending longitudinally within said handle body from said drive end, said bit storage apertures being arranged in a circular pattern about the central axis of said handle body;

b) a base having an attachment end and a shaft end, said attachment end being rotatably attached to said drive end such that said handle body can be rotated in relation to said base;

c) a selection aperture passing through said base from said attachment end to said shaft end, wherein at said attachment end, said selection aperture can be

selectively aligned with one of said bit storage apertures upon rotation of said handle body;

d) a hollow shaft extending from said shaft end, the extreme end of said shaft being the bit end; and

e) locking means at said bit end to selectively engage a bit in a torque-transmitting engagement;

wherein when a bit storage aperture is aligned with said selection aperture, a channel is formed which will allow a bit to travel from said selected bit storage aperture through said base and shaft to said bit end.

2. The screwdriver of Claim 1 further comprising bits within said bit storage apertures.

3. The screwdriver of Claim 1 wherein said cap end is removable, and said bit storage apertures extend through said handle body from said drive end to said cap end.

4. The screwdriver of Claim 1 wherein said bit end prohibits the removal of a bit from said shaft.

5. The screwdriver of Claim 1 further comprising an indicator to show when said selection aperture is properly aligned with a bit storage aperture.

6. The screwdriver of Claim 1 wherein said base and said shaft are a single integral body.

7. The screwdriver of Claim 1 wherein said shaft extends through said base to said attachment edge, and defines said selection aperture.

8. The screwdriver of Claim 1 wherein said shaft includes and offset crank section.

9. The screwdriver of Claim 1 wherein said shaft is straight.

10. The screwdriver of Claim 9 wherein said handle body, base and hollow shaft share the same longitudinal axis through the centre of the drive end of said handle body.

LISTING OF DIAGRAM REFERENCE NUMERALS:

1. screwdriver;
2. handle body;
3. cap end of handle body;
4. drive end of handle body;
5. bit storage aperture;
6. centre point of handle body;
7. base;
8. selection aperture;
9. attachment end of base;
10. shaft end of base;
11. centre of base;
12.
13. shaft;
14. bit end of shaft;
15. locking means;
16. bits;
17. central axis;
18. indicator markings;
19. selection mark;
20. offset crank

FIGURE 1:

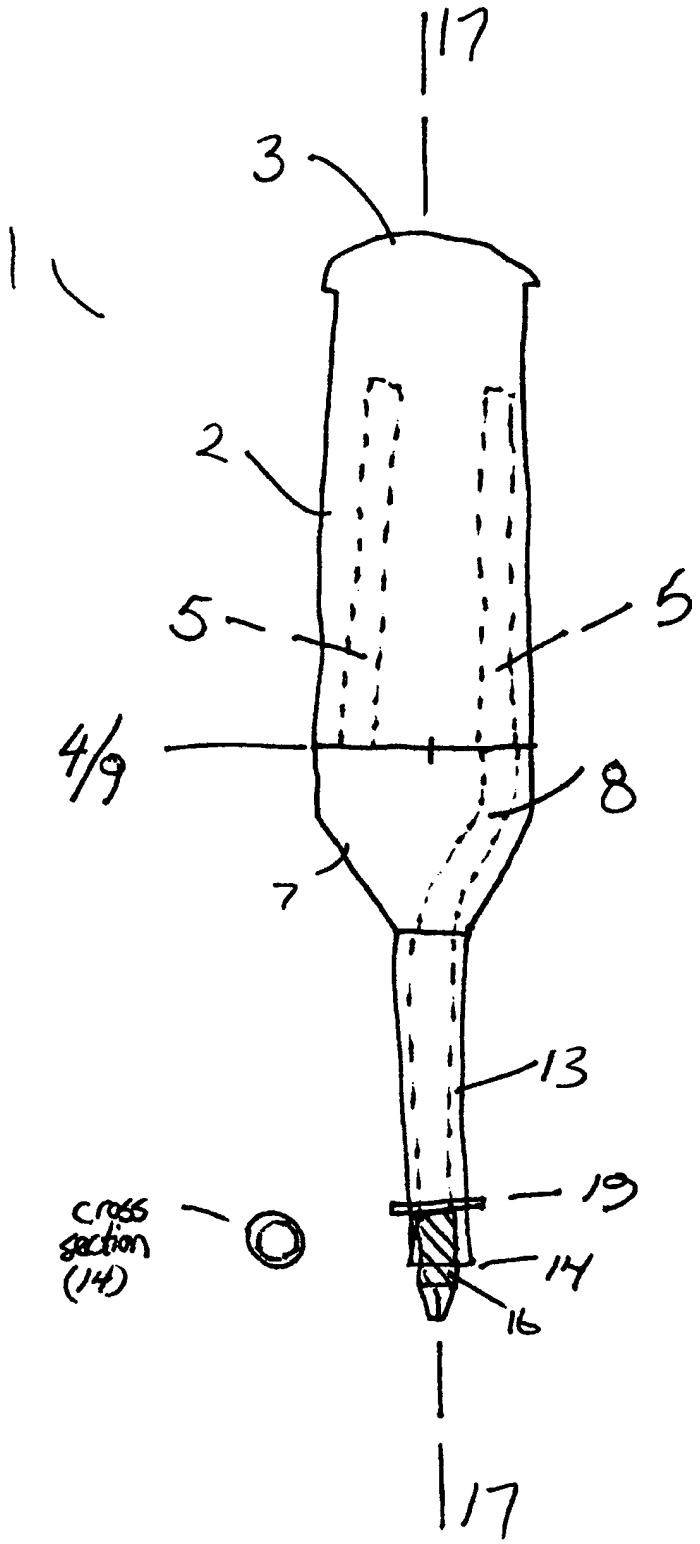


FIGURE 2:

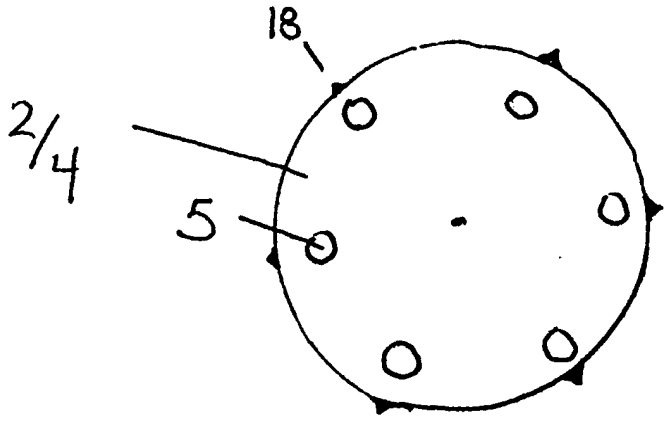


FIGURE 3:

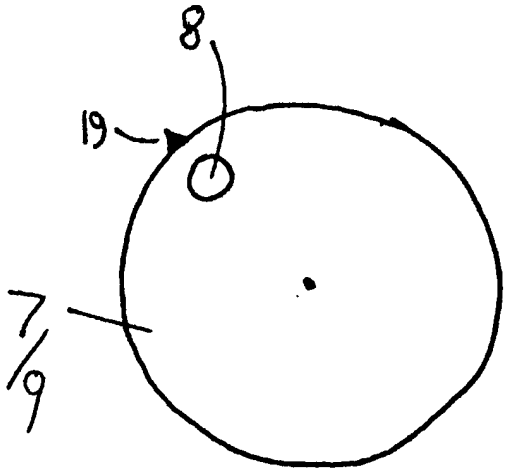


FIGURE 4:

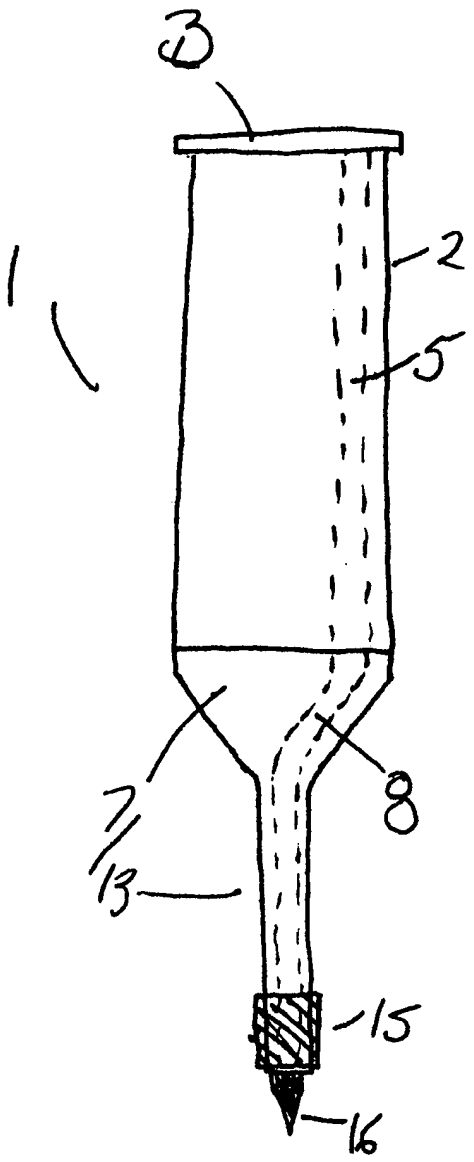


FIGURE 5: